

PROCEEDINGS  
OF THE  
CALIFORNIA ACADEMY OF SCIENCES  
FOURTH SERIES

Vol. XXXV, No. 9, pp. 157-192; 12 figs.; 8 tables

November 22, 1967

SURVEY OF THE REPTILES OF THE  
SHEIKHDOM OF ABU DHABI,  
ARABIAN PENINSULA

PART II. SYSTEMATIC ACCOUNT OF THE  
COLLECTION OF REPTILES MADE IN THE  
SHEIKHDOM OF ABU DHABI BY  
JOHN GASPERETTI

By

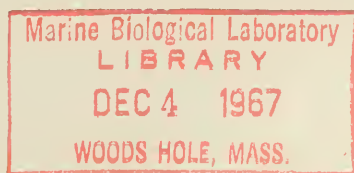
Alan E. Leviton and Steven C. Anderson

*California Academy of Sciences, San Francisco 94118*

INTRODUCTION

Few of the remote areas of the world have received so little attention as the Trucial Coast, located on the Persian Gulf coast of the Arabian Peninsula. Reptiles of this region have not been studied previously, although a few records exist. Collections have been made in the Dhahran [Aḏ Ḑahrān] oil field area to the northwest by John Gasperetti, which formed the subject of a report by Haas, in 1957. To the southeast of the Trucial Coast reptiles and amphibians of Muscat have received incidental attention from various authors such as Anderson (1896), Boulenger (1887, 1888) and Murray (1886).

In 1964, Mr. Gasperetti, while engaged as site engineer on a road construction project amassed the most significant collection of reptiles ever to come out of this remote region. As a result of his kindness in depositing the material at the Academy, we are able to report on this unique collection and to extend further our knowledge of the vast wastes of the Arabian Peninsula. Gasperetti (1967) has provided a geographic sketch of the region.



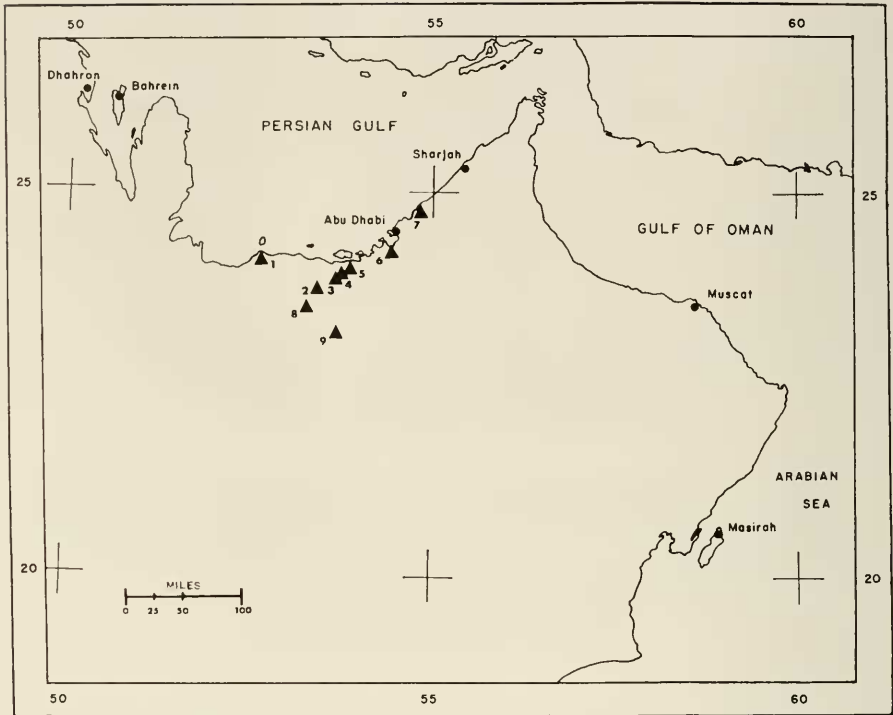


FIGURE 1. Station records for herpetological materials collected by John Gasperetti during 1964 in the Abu Dhabi region.

#### STATION RECORDS

(Figure 1.)

##### Station

- |    |                      |  |
|----|----------------------|--|
| 1  | 24°11' N., 52°36' E. | Jabal Dhanna [Aḏ Ḍannah]   |
| 2  | 23°41' N., 53°28' E. | Beda Azan  |
| 3  | 23°50' N., 53°37' E. | Ḥabshān  |
| 4  | 23°54' N., 53°40' E. | 5 km. north of Ḥabshān   |
| 5  | 24°03' N., 53°46' E. | Tarīf [Aṭ Ṭarīf]   |
| 6  | 24°15' N., 54°28' E. | 84 km. from Tarīf toward Dubai   |
| 7  | 24°50' N., 54°45' E. | Halfway between Dubai and Abu Dhabi                                    |
| 8  | 23°45' N., 53°33' E. | [A circle with 15 km. radius]  |
| 9  | 23°07' N., 53°39' E. | Liwā' between Zuwaiha and Taraq Oasis                                  |
| 10 | 23°57' N., 53°41' E. | (See station 4 on map) Murban, near<br>Santa Fe Drilling Company camp. |

#### ACKNOWLEDGMENTS

The collection of reptiles on which this report is based was made by Mr. John Gasperetti, to whom we are indeed indebted for both depositing this signifi-

cant collection at the California Academy of Sciences, and his long and continuing interest in our work. To solve problems in systematics and zoogeography relating to the Arabian Peninsula, we have often asked for loans and other assistance from curators at other institutions, who have always been most generous to us. Miss Alice Grandison, British Museum (Natural History); Dr. Robert F. Inger and Mr. Hymen Marx, Field Museum of Natural History (Chicago, Illinois); Dr. Richard Zweifel, American Museum of Natural History (New York); Dr. Robert C. Stebbins, Museum of Vertebrate Zoology, University of California (Berkeley, California); Mr. Neil B. Richmond and Dr. Clarence McCoy, Carnegie Museum (Pittsburgh, Pennsylvania); and Drs. Georg Haas and Yehudah Werner, Hebrew University (Jerusalem, Israel) have been most considerate of our many requests.

## SYSTEMATIC ACCOUNT

### FAMILY AGAMIDAE

#### Genus *Agama* Daudin

#### *Agama jayakari* J. Anderson.

(FIGURES 2 A-B.)

*Agama jayakari* J. ANDERSON, 1896, Herp. Arabia, p. 65 (type locality: Maskat [= Muscat], Arabia). HAAS, 1957, Proc. Calif. Acad. Sci., ser. 4, vol. 29, p. 67 (Shināṣ, Batinah Coast, Trucial Coast).

MATERIAL EXAMINED. One specimen. Station 6 (12 April 1964): CAS 97804, female.

REMARKS. This specimen is provisionally identified as *A. jayakari*. It differs from the original description in lacking prominent mucronate points on the scales of the occiput and above, below and behind the ear. The body is depressed. The scales are subequal, being less regular than those of *A. sanguinolenta*, more so than those of *A. blanfordi* [formerly *A. persica* Blanford] (S. Anderson, 1966). The animal is very light in color, the dorsal pattern scarcely discernible, the dorsum suffused with light brown, intermixed with lighter scales; the tibia, foot, and tail are lightly barred above. There are approximately 84 scales around the middle of the body. Large eggs were found in the ovaries; beetles and ants formed the recognizable stomach contents.

CAS 84416, female, from Qatīf, Saudi Arabia, previously identified by Haas (1957, p. 66) as *A. agilis*, is referable to this species (fig. 2B).

*Agama jayakari* appears to be allied to *A. blanfordi* and *A. flavomaculata*.

#### Genus *Phrynocephalus* Kaup

#### *Phrynocephalus arabicus* J. Anderson.

(FIGURES 3A-C, 4A-C.)

*Phrynocephalus arabicus* J. ANDERSON, 1894, Ann. Mag. Nat. Hist., ser. 6, vol. 14, p. 377 (type locality: Hadramut [Hadramawt], southwestern Arabia).

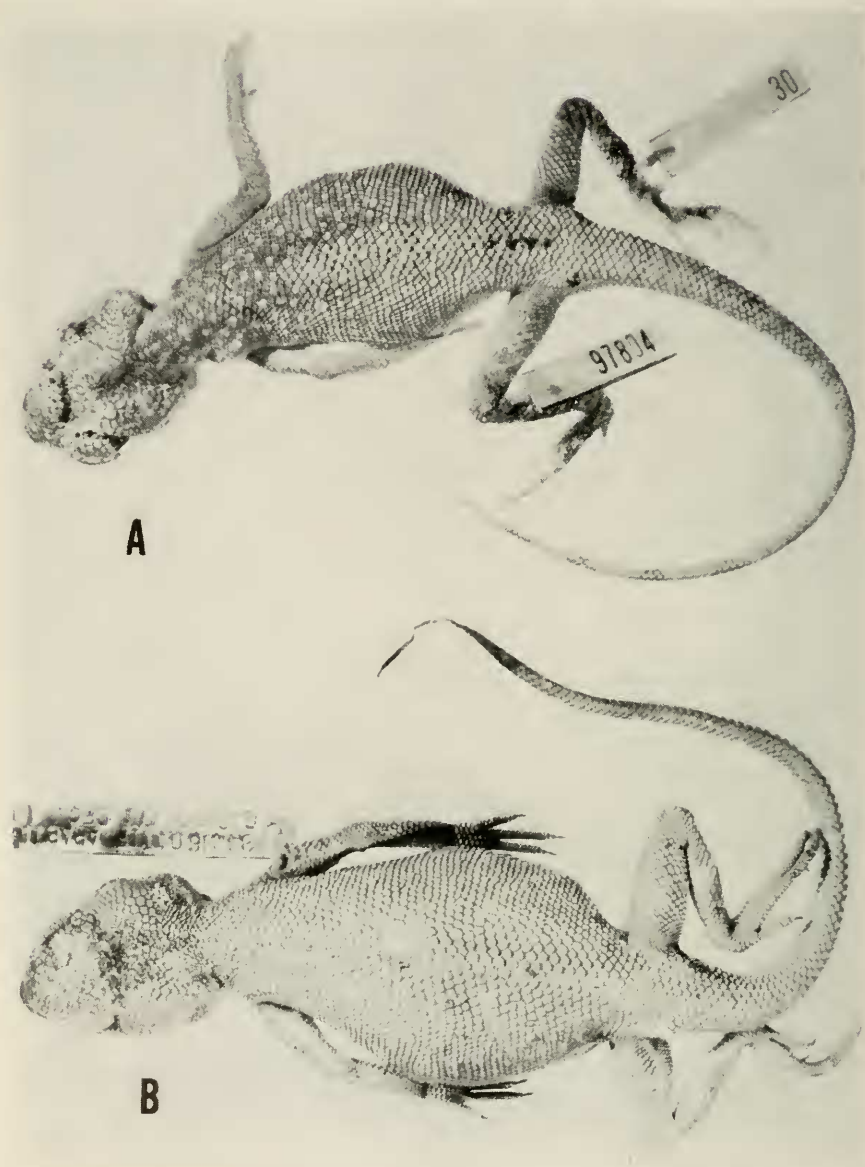


FIGURE 2. A. *Agama jayakari* [CAS 97804] from Abu Dhabi region. B. Specimen identified by Haas (1957) as *Agama agilis* but which we regard as *A. jayakari*.



*Phrynocephalus nejdensis* SCHMIDT and INGER, 1957, "Living Reptiles of the World," p. 83 (*nomen nudum*, inasmuch as all conditions of Article 13, Section a, of the International Rules of Zoological Nomenclature are not satisfied). HAAS, 1957, Proc. Calif. Acad. Sci., ser. 4, vol. 29, p. 68 (type locality: Nafud, near Qana, North Nejd, WNW of Hail, Saudi Arabia).

*Phrynocephalus nejdensis macropeltis* HAAS, 1957, Proc. Calif. Acad. Sci., ser. 4, vol. 29, p. 69 (type locality: Dhahran [Aḏ Ḑahrān], Saudi Arabia); 1961, Ann. Carnegie Mus., vol. 36, p. 22 (Al Hasa, Saudi Arabia).

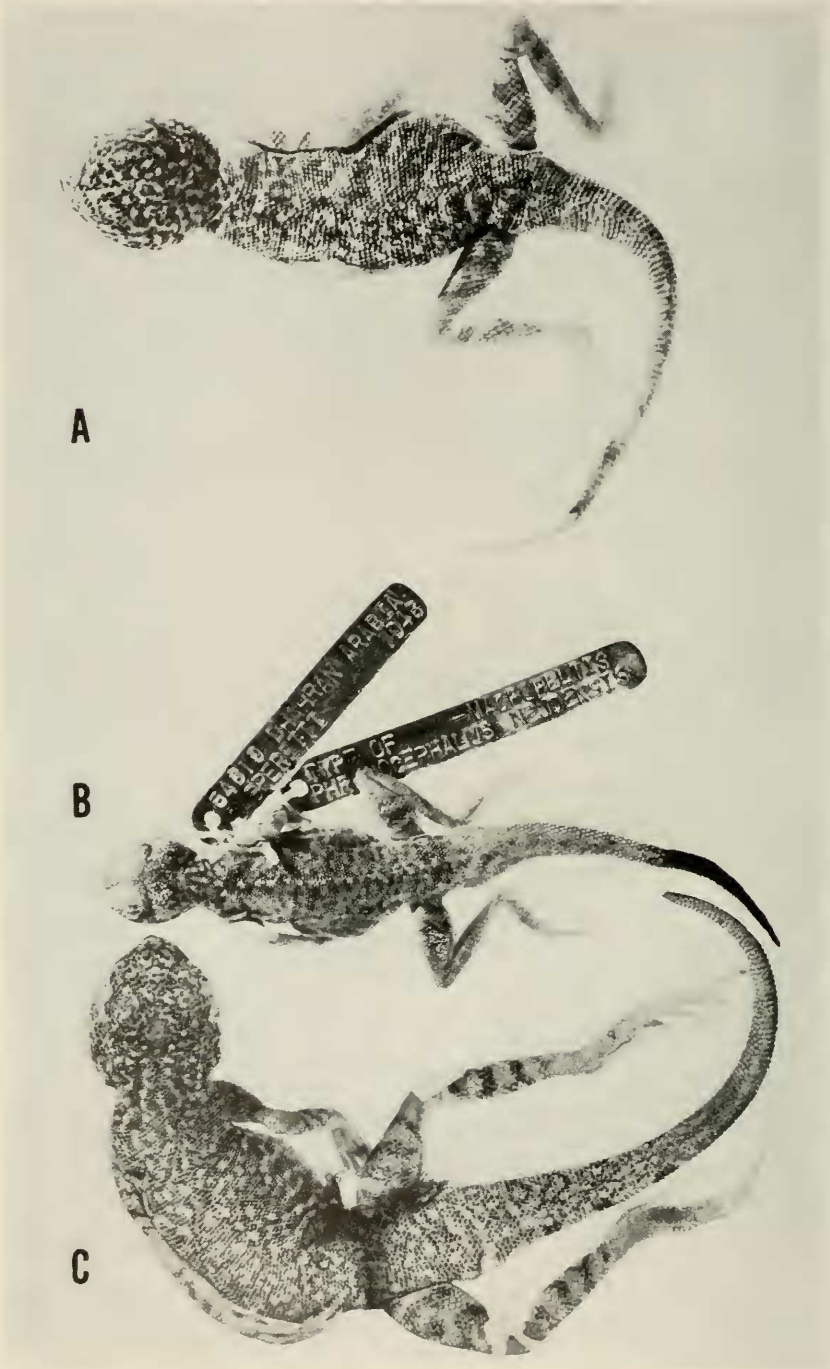
**MATERIAL EXAMINED.** From Trucial Coast 12 specimens: Station 3 (13 April 1964): CAS 97819. Station 4 (13 April 1964): CAS 97815. Station 8 (5–19 May, 20–25 July, 3 August, 9 September, 1964): CAS 97814, 97816–97818, 97820–97821, 97823–97825. Five kilometers south of Beda Azan (26 June 1964): CAS 97822.

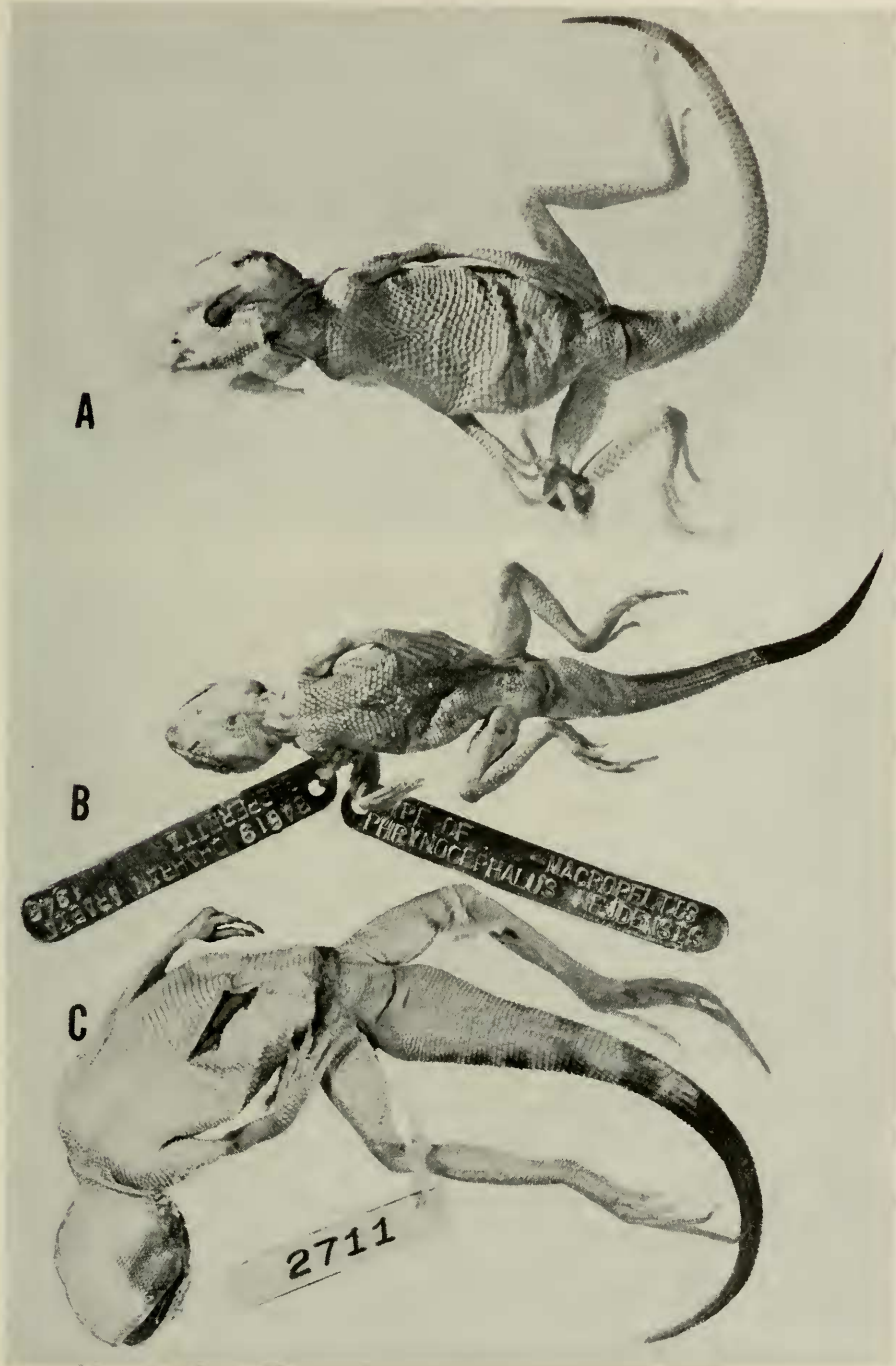
**REMARKS.** We have examined, in addition to the material listed above from the Trucial Coast, the type of *P. nejdensis* (figs. 3C, 4C), the type and paratypes of *P. nejdensis macropeltis* (figs. 3B, 4B), and a syntype of *P. arabicus* (figs. 3A, 4A). We are unable to distinguish these nominal species and conclude they represent but one taxon, the oldest available name for which is *P. arabicus*. Haas, in describing *P. nejdensis* and *P. n. macropeltis* as new, contends that these differ from *P. arabicus* in having the adlabials better developed and reaching the first lower labial, and in having smaller gular, ventral and proximal subcaudal scales, a larger number of upper and lower labials, and in the flatness of the dorsal head scales. Further, Haas distinguishes *P. nejdensis macropeltis* from the nominal form by its having larger ventral scales, about 90 scales around the middle of the body rather than 115, the head scales more bulging, and some pectoral scales keeled.

Re-examination of all the material seen by Haas, supplemented by the Trucial Coast specimens and the syntype of *P. arabicus*, reveals that the differences cited by Haas were illusory. For example, the type of *P. nejdensis* (HUJ 2711) has 94 scales (and granules) around the middle of the body, not 115 as given by Haas. This compares with a range of 74–95 (mean  $85.4 \pm 1.52\text{SE}$ ) for 18 paratypes of *P. nejdensis macropeltis* from Dhahran, 78–97 (mean  $87.8 \pm 1.52\text{SE}$ ) for 15 specimens from Abqaiq, and 79–104 (mean  $87.8 \pm 1.88\text{SE}$ ) for 11 specimens from the Trucial Coast we believe compare favorably with a syntype of *P. arabicus*. In a like manner pectoral scales, which are all mucronate, are strongly keeled in six individuals of the Dhahran series, smooth in eight, and partially keeled and partially smooth in four; three of the Abqaiq series have strongly keeled pectoral scales, six have mixed keeled and smooth scales, and six

---

FIGURE 3 (overleaf left) and FIGURE 4 (overleaf right). A. *Phrynocephalus arabicus* [BM 1946.8.28.33; Syntype]. B. Holotype of "*Phrynocephalus nejdensis macropeltis*" [CAS 84819]. C. Holotype of "*Phrynocephalus nejdensis*" [HUJ 2711].





have smooth scales, all of which, however are mucronate. Of 11 specimens from the Trucial Coast, one possessed strongly keeled pectoral scales, in three there were scattered keeled and smooth pectoral scales, and in seven, the pectoral scales were largely smooth, though still mucronate. Probably preservation affects the degree of observed keeling inasmuch as those animals having softer bodies have lost the epidermal scale coverings and appear rather smooth. In a like manner, we found variation in the development of adlabials, their contact with the first lower labial, the number of upper labials, which ranged from 13 to 18 (the number depending in large part on whether the posteriormost scales were broken up or not) and in the size and number of the ventral and gular scales. We could not detect any significant differences among the series available to us, not even in color pattern, considering the poor preservation of some of the material, or in the extent of black on the distal third of the tail, if allowance is made for ontogenetic changes. In freshly preserved material there is much bright yellow pigment on the dorsal surfaces of head and body; older preserved material lacks the pigment, retaining only a mottling of dark browns and blacks interspersed extensively with a cream (yellow in life) reticulum.

We are forced to regard Haas' two nominal forms as synonyms of *P. arabicus* Parker.

#### Genus *Uromastyx* Merrem

##### *Uromastyx microlepis* Blanford.

*Uromastyx microlepis* Blanford, 1874, Proc. Zool. Soc. London, 1874, p. 658 (type locality: vicinity of Basrah, Iraq).

MATERIAL EXAMINED. Five specimens. Station 8 (July–August, 1964): CAS 97833–97837.

REMARKS. Mertens (1956) feels that *U. microlepis* probably should be considered a subspecies of *U. aegyptius*. Schmidt (1939) commented that it is difficult to distinguish the two forms by means of presence or absence of enlarged lateroventral tubercles inasmuch as the tubercles are sometimes reduced or few in number. None of the present specimens possess these tubercles and therefore agree closely with the description of *U. microlepis*.

#### FAMILY GECKKONIDAE

##### Genus *Bunopus* Blanford

##### *Bunopus abudhabi* Leviton and Anderson, new species.

(Figure 5.)

HOLOTYPE. CAS 98089, male, collected within a circle of about 15 km. radius centered about 23° 45' N., 53° 35' E., Abu Dhabi region, Trucial Coast, on 4 August 1964 by John Gasperetti.

PARATYPES. Two females. CAS 97847-97848, collected 7 August 1964 at the same locality and by the same collector as the holotype.

DIAGNOSIS. No enlarged postmentals; scales of ventral surface of body and tail smooth; distal two-thirds of tail with a single series of transversely enlarged, smooth, plate-like subcaudals.



FIGURE 5. *Bunopus abudhabi* [CAS 98089; Holotype].

DESCRIPTION OF HOLOTYPE. Diameter of eye equal to distance between orbit and nostril; vertical diameter of elliptic ear opening equal to one-half diameter of eye. Length of head (to angle of jaw) contained  $3\frac{1}{2}$  times in snout-vent length. Hind limb reaches shoulder; forelimb reaches tip of snout.

Rostral quadrangular, broader than high; mental semicircular; no enlarged postmentals; 12/11 supralabials; 12/10 infralabials. Nostril between rostral, first supralabial, and three nasals; supranasals separated by a single small scale. Snout covered by swollen smooth scales, top of head covered by rounded, smooth tubercles, becoming keeled on occiput.

Dorsum covered by small, flat, smooth, juxtaposed scales and 16 fairly regular longitudinal series of enlarged, keeled, trihedral tubercles. Scales of chin and throat small, granular, juxtaposed. Scales of venter flat, smooth, imbricate, the free margin of each finely denticulated. Dorsal surface of hind limbs covered by small, irregular, subimbricate scales and scattered enlarged trihedral tubercles; forelimbs covered above by imbricate keeled scales. Tail with annuli each composed of four transverse series of keeled imbricate scales dorsally, each series of four becoming progressively larger distally. Proximal



fourth of tail covered below with weakly keeled scales, somewhat larger than those of dorsal surface; distal three-fourths of tail covered by a single series of large, smooth, plate-like scales, two in each annulus.

Digits covered below with imbricate transverse lamellae, the free distal margin of each lamella with a fine denticulation, most distinct on the proximal lamellae of each digit. The lamellae are not keeled or swollen.

Ten preanal pores in a continuous series.

Color in preservative (initial fixation in formalin, transferred to alcohol) light tan above, with darker brown markings on the dorsum arranged in poorly defined transverse bars, one on neck, one between shoulders, three on back between limbs, and one on pelvic region. A broad dark band from tip of snout through eye to temporal and occipital regions; lips, chin, and throat flecked with brown; limbs and tail above with irregular dark cross bars. Each scale of dorsum has one to many melanophores. Venter white.

Measurements (in millimeters):

CAS 98089 (type)	43.7 snout-vent	63.3 tail
97847	42.5	—
97848	27.3	38.0

REMARKS. The paratypes, one adult and one juvenile, both females, lack preanal pores. This species is allied to *Bunopus tuberculatus* from which it is distinguished by the presence of enlarged, smooth, plate-like subcaudal scales on the distal portion of the tail, and by the less distinct denticulation on the free margins of the subdigital lamellae. It is readily distinguished from *B. blanfordi* by its less attenuate habitus, and its smooth ventral scales, as well as the enlarged subcaudals. *Bunopus crassicaudus* Nikolsky also has enlarged subcaudal plates, but is the only member of the genus examined having enlarged postmentals. This latter species also has very distinct dark transverse bars on the dorsum.

*Trachydactylus jolensis* Haas and Battersby (1959) appears to be a synonym of *Bunopus spatalurus* Anderson (1901). *Bunopus spatalurus* differs from all other species of its genus in lacking enlarged dorsal tubercles. While we believe Haas and Battersby are justified in not recognizing this form as belonging to *Bunopus*, we are not yet prepared to comment on its generic allocation. For the present this taxon should be known as *Trachydactylus spatalurus*.

Mertens (1965) has pointed out that in resurrecting the generic name *Bunopus* our characterization (Leviton and Anderson, 1963) was insufficient to distinguish species of this nominal genus from other geckos included in the nominal genus *Alsophylax*. To our previous comments we may add that all of the species we have examined and assign to the nominal genus *Bunopus* have, in addition to enlarged dorsal tubercles, imbricate subdigital lamellae, the free distal margins of which are denticulate, and have a denticulation on some or all of the ventral



scales. This includes *Bunopus tuberculatus* Blanford, *B. blanfordi* Strauch, *B. crassicaudus* Nikolsky, and *Bunopus abudhabi* Leviton and Anderson.

### Genus *Stenodactylus* Fitzinger

In his recent review of the gekkonid genera, Kluge (1967) placed the nominal genus *Ceramodactylus* (type species *C. doriae*) in the synonymy of *Stenodactylus* (type species *S. elegans*). We tentatively accept Kluge's arrangement and assign our new species, which is described below, and is most closely allied to *Stenodactylus* (formerly *Ceramodactylus*) *major*, to the nominal genus *Stenodactylus*. While we do not doubt that the western species of *Stenodactylus* (strict sense) and the ceramodactylid group of species are allied, we suspect that they may be sufficiently distinct to justify altering Kluge's nomenclatural arrangement somewhat. We cannot yet express ourselves on the positions of *Pseudoceramodactylus* and *Trigonodactylus*, both nominal genera having been referred to the synonymy of *Stenodactylus*, too. Kluge's assignment of the eastern stenodactylids, *S. maynardi*, *S. orientalis*, and *S. lumsdeni*, to the nominal genus *Crossobamon* is probably right; certainly it makes better zoogeographic sense than did the earlier arrangement.

***Stenodactylus leptocosymbotes* Leviton and Anderson, new species.**

(Figures 6A, 7A.)

**HOLOTYPE.** CAS 97841, adult female, collected half way between Dubai and Abu Dhabi [24° 50' N., 54° 45' E.], Trucial States, 21 May 1964, by John Gasperetti.

**PARATYPE.** CAS 102366, male, collected 35 km. north and 60 km. west of Al Lith, near Bir Khadrah [20° 20' N., 40° 0' E.], Saudi Arabia, 22 April 1965, by John Gasperetti.

**DIAGNOSIS.** Lateral fringes on digits poorly developed; at most three or four enlarged median subdigital lamellae at tip of fourth toe; mental slightly longer than broad, not broader than rostral; dorsal scales slightly rugose, ventral scales with two or three keels on posterior portion of each scale; seven or eight longitudinal rows of carinated subdigital scales; 14–15 supralabials; back with scattered dark spots or a reticulum of dark lines; forelimb, extended forward, reaches to between nostril and eye, does not extend beyond nostril.

**DESCRIPTION OF HOLOTYPE.** Habitus slightly depressed; head cordiform, equal to nearly one-third of snout-vent length. Diameter of eye equal to distance between eye and nostril. Ear opening vertically oval, equal to one-third diameter of eye. Rostral septagonal, nearly twice as broad as high; nostril in a swollen protuberance, bordered by rostral and three nasals; internasals broadly in contact; 14 supralabials on right side, 15 on the left; 15 infralabials; mental  $1\frac{1}{2}$  times as long as broad, with a curved posterior margin, its width slightly

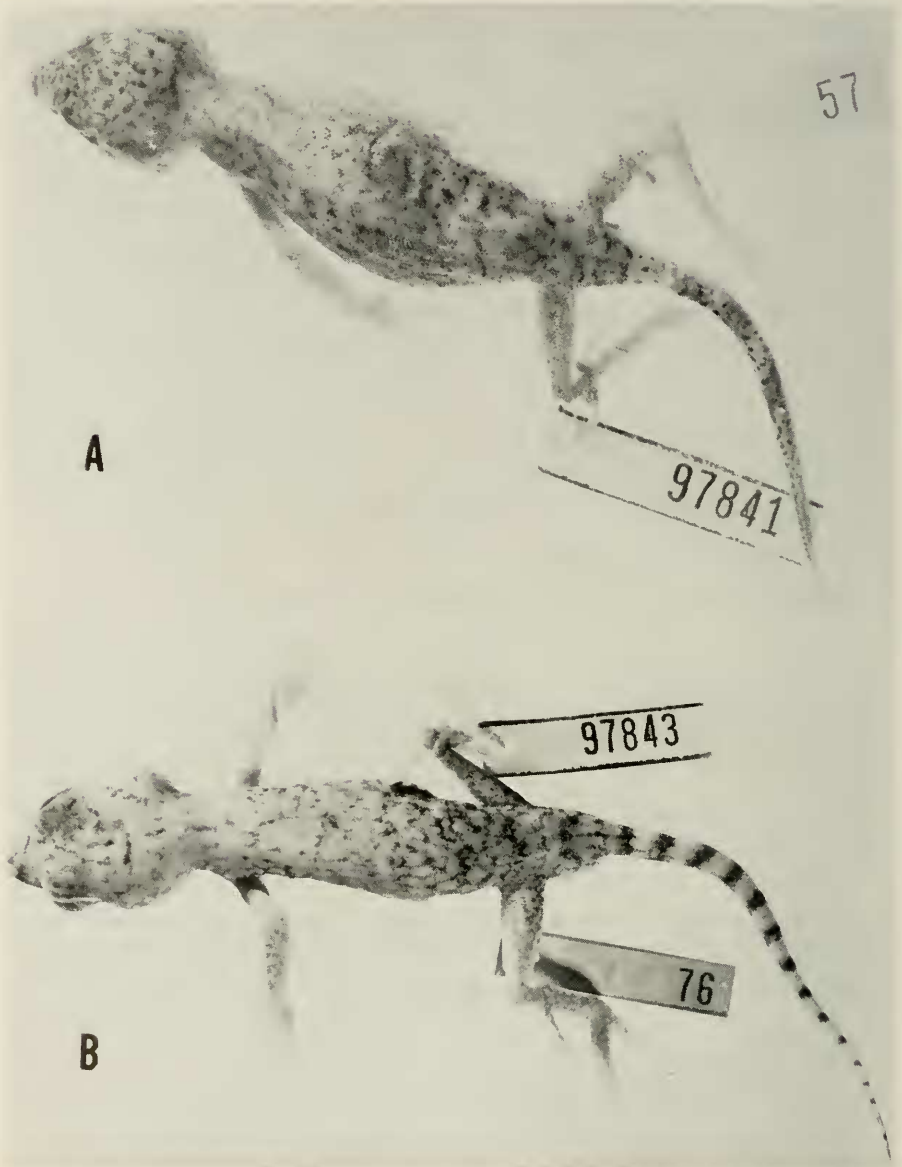


FIGURE 6. A. *Stenodactylus leptocosymbotes* [CAS 97841; Holotype]. B. *Stenodactylus major* [CAS 97843].

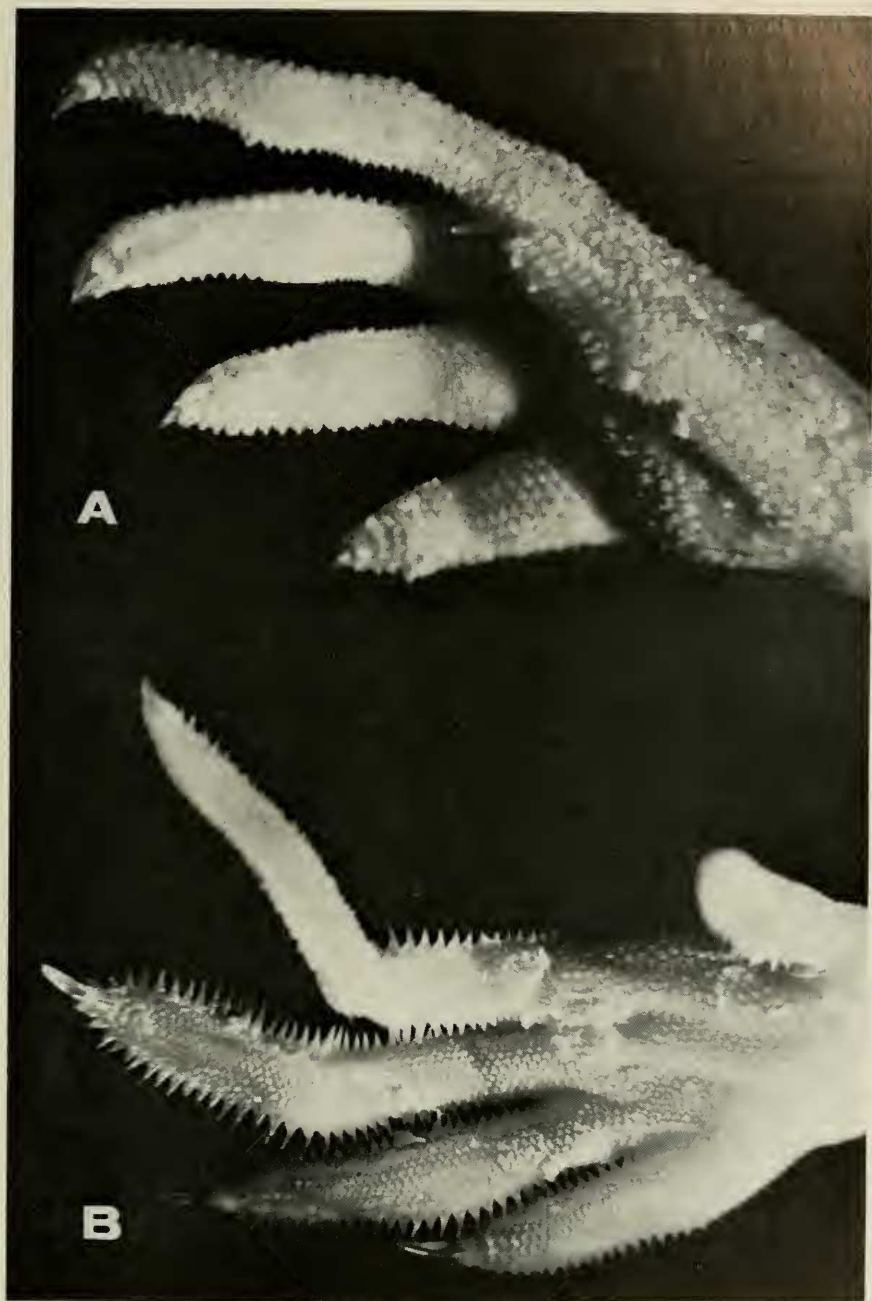


FIGURE 7. A. Ventral surface of foot of *Stenodactylus leptocosymbotes* [CAS 97841; Holotype]. B. Ventral surface of foot of *Stenodactylus major* [CAS 97843].

less than that of the rostral; no enlarged postmentals. Head covered by rugose, polygonal granules, largest on snout; chin and throat covered with rugose, conical granules. Scales of back uniform, rugose, juxtaposed, becoming subimbricate near base of tail. Ventral scales rugose, subimbricate.

Forelimb reaches to beyond end of snout; extended backward it reaches  $\frac{2}{3}$  distance between axilla and groin; hind limb reaches shoulder. Scales of limbs similar to those of back. Fingers covered above with rugose imbricate scales in about eight longitudinal rows, the distal three scales of the median row transversely broadened, having multiple keels; toes above similarly covered with about six longitudinal rows above. Digits below with small, tricarinate scales, longitudinally and obliquely arranged (seven or eight longitudinal rows), the three or four distal median scales transversely expanded to form narrow lamellae. No pronounced lateral fringe, the ventrolateral scales of the digits being similar in their carination and denticulation to those of the subdigital surface.

Tail shorter than head and body, covered by uniform, distinctly keeled, imbricate scales, each row in an annulus around the tail (somewhat irregular on mid-ventral aspect). No enlarged subcaudal plates. Caudal scales less distinctly keeled in proximal few annuli.

Two preanal pores, each in an enlarged scale, and separated by six scales.

Measurements (in millimeters): Snout-vent, 60.8; tail, 47.1; head length (to angle of jaw), 17.7; head width (at posterior angle of jaws), 14.5; femur, 12.8; forelimb, 25.4; diameter of eye, 4.6; vertical diameter of ear, 1.7.

Color (in alcohol, initially preserved in formalin): head, back, and limbs with poorly defined light gray-brown reticulations. Lips flecked with gray. Ventral surface immaculate white. Tail with four light gray-brown crossbars on dorsum. A color photograph of the type in life shows no marked color pattern other than the light brownish reticulum already noted; the melanophores appear to be somewhat more expanded than in the preserved animal; interstitial skin pinkish. The photograph also reveals that the crossbars on the tail were much darker in life.

REMARKS. The paratype, a male, agrees with the holotype in the above characters except that the reticulum of brownish lines is darker.

There is a large egg in each oviduct of the type.

### *Stenodactylus major* (Parker).

(Figures 6B, 7B.)

*Ceramodactylus major* PARKER, 1930, Ann. Mag. Nat. Hist., ser. 10, vol. 6, p. 594 (type locality: Hadramaut [Hadramawt], Rub' al Khali, Saudi Arabia).

MATERIAL EXAMINED. Five specimens. Station 2 (July–September, 1964): CAS 97838–97840; (18 July 1964): CAS 97842. Station 8 (18 June 1964): CAS 97843.

REMARKS. Haas (1957, p. 58, fig. 5 [of fingers]) reported on a specimen from Shārjah, north of Abu Dhabi, on the Trucial Coast.

Our specimens agree with Parker's original description except that the ventral scales are distinctly rugose. The tail is barred above with brown. These specimens also have a light brown reticulum on the dorsum.

In questioning the generic status of species assigned to *Ceramodactylus*, Anderson (1898, p. 35) calls attention to the fact that in *C. affinis* the mesial subdigital scales tend to be larger than adjacent rows, those on the distal part of the digit resembling the lamellae of species of *Stenodactylus*. This is also true for *C. major*, there being three to five broad lamellar scales proximal to the subungual lamella. While the subdigital scales are arranged in regular longitudinal series, they do not form regular transverse rows, being obliquely arranged.

The largest specimen, CAS 97842, female, has a snout-vent length of 76 mm., the tail being 72 mm.

#### Genus *Cyrtodactylus* Gray

##### *Cyrtodactylus scaber* (Heyden).

*Stenodactylus scaber* HEYDEN, 1827, in: Rüppell, Atlas N. African Rept., p. 15, pl. 4, fig. 2 (type locality: Arabia).

*Cyrtodactylus scaber*, UNDERWOOD, 1954, Proc. Zool. Soc. London, vol. 124, p. 475.

MATERIAL EXAMINED. Four specimens. Station 5 (July 1964): CAS 97844–97846; (7 August 1964): CAS 98090.

#### FAMILY LACERTIDAE

##### Genus *Acanthodactylus* Wiegmann

##### *Acanthodactylus cantoris schmidtii* Haas.

(Figure 8.)

*Acanthodactylus cantoris schmidtii* HAAS, 1957, Proc. Calif. Acad. Sci., ser. 4, vol. 29, p. 72 (type locality: Dhahran [Aḏ Ḍahrān], Saudi Arabia).

MATERIAL EXAMINED. Two specimens. Station 8 (29 July, 24 May 1964): CAS 97801–97802.

REMARKS. This nominal taxon was not illustrated when described by Haas (1957). The holotype is figured here.

##### *Acanthodactylus gongrorhynchatus* Leviton and Anderson, new species.

(Figures 9A, 10A.)

*Acanthodactylus scutellatus* PARKER, 1931, Ann. Mag. Nat. Hist., ser. 10, vol. 8, p. 521 (Bahat Jamal, Rub' al Khali, Saudi Arabia); 1932, in: Thomas, B., "Arabia Felix," p. 344 (listed).

*Acanthodactylus fraseri* (not Boulenger), HAAS, 1957, Proc. Calif. Acad. Sci., ser. 4, vol. 29, p. 72 (part).





FIGURE 8. *Acanthodactylus cantoris schmidtii* [CAS 84599; Holotype].

HOLOTYPE. CAS 97803, female, collected at Beda Azan [ $23^{\circ}41' \text{ N.}$ ,  $53^{\circ}28' \text{ E.}$ ], Abu Dhabi [Abū Zaby], Trucial Coast, 26 June 1964, by John Gasperetti.

PARATYPES. Seven specimens, all collected by J. Gasperetti in the Al Hasa district, Saudi Arabia. Abqaiq [Buqayq]: CAS 84339, male, July, 1945; CAS 84333, female, 29 June 1945; CAS 84486, female, 18 June 1946; FMNH 73988, July, 1945. El Alat [Al Alat]: CAS 84433, female; CAS 84436, female, 31 May 1946. Dhahran [Az Zahrān]: CAS 84271, [male, September, 1945].

DIAGNOSIS. Four series of scales around fingers, lateral and median series enlarged to form fringes, lamellae with single median keel and sloping sides; snout  $1\frac{1}{2}$  times the length of the postocular part of head; 4 upper labials to below center of eye; 4 supraoculars, the fourth partially broken up into small granules; ventral plates in 10–14 almost straight longitudinal series, the median plates distinctly broader than long; posterior dorsal scales small, subimbricate, with prominent keels, in 56–77 longitudinal rows and 26–32 transverse rows between hind limbs; gular shields 34–44; 24–29 lamellae beneath fourth toe; frontonasal longer than broad, one or two slightly enlarged gular granules bordering chin shields four and five; temporal granules keeled; femoral pores distinct, 20–25 on each side.

DESCRIPTION OF HOLOTYPE. Habitus slender, body moderately depressed. Head (snout to angle of jaw)  $1\frac{3}{4}$  times as long as broad, its length  $3\frac{1}{2}$  times in distance from tip of snout to vent; its height equal to distance between center of eye and angle of jaw; a lanceolate concavity from frontonasal to the middle



of the frontal; snout acutely pointed, about  $1\frac{1}{4}$  times as long as the postocular part of head, with sharp canthus and scarcely concave loreal region; nasals distinctly swollen. Neck narrower than head. Hind limb reaches in front of tympanum; foot (exclusive of claw)  $1\frac{1}{4}$  times as long as head; fourth toe, from the base of the fifth, longer than head.

Upper head shields convex, smooth. Rostral broader than mental; suture between nasals about  $\frac{1}{2}$  the length of the frontonasal, which is  $1\frac{1}{4}$  times as long as broad, and broader than the internarial space; prefrontals nearly twice as long as broad, forming an extensive median suture; frontal equal to  $\frac{1}{2}$  its distance from the end of snout, about as long as the frontonasal, twice as long as broad, narrowed posteriorly; frontoparietals longer than broad; parietals broader than long; three large supraoculars, the second largest, the position of the fourth occupied by granules and two larger scales; five (on the left) and six (on the right) superciliaries, first longest and in contact with the first supraocular, the others separated from the supraoculars by a series of granules. Anterior loreal shorter than second; four supralabials anterior to the center of the eye, the fourth the longest; subocular sharply keeled below the eye, and forming an angle wedged in between the fourth and fifth supralabials, not in contact with the border of the mouth. A keeled upper temporal shield followed by two smaller shields; temporal scales elongate, keeled, upper small, lower large; a narrow tympanic shield, keeled and projecting, shelf-like; a single, vertically elongate shield inside the anterior margin of the ear opening; no denticulation at anterior ear margin.

Five pairs of chin shields, the first three in contact in the middle. Gulars small, 28 between the symphysis of the chin shields and the median collar-plate, enlarged toward the collar. Collar free, curved, containing seven large plates.

Dorsal scales granular and weakly keeled on nape, becoming oval to rhombic on body, and more distinctly keeled, larger and subimbricate towards the tail, smaller on flanks; 59 dorsal scales across the middle of the body, 26 in a transverse series between the hind limbs. Ventral plates in more or less straight longitudinal series, the median four rows straight, the outer rows becoming somewhat oblique, 12 in the longest transverse series, the outer ventrals tending to grade into the lower flank scales; all ventral plates distinctly broader than long; a median series of three transversely enlarged preanal plates, increasing in size posteriorly, the plate bordering the vent semidivided.

Twenty-one femoral pores on each side, the two series narrowly separated in the middle.

Fingers strongly serrated, with four series of scales, the lamellae each with a single median keel; toes strongly serrated, the fringes on outer aspect of fourth toe as long as diameter of toe; 24 obtusely keeled lamellae under the fourth toe.

Caudal scales much larger than posterior dorsals; median dorsal caudals

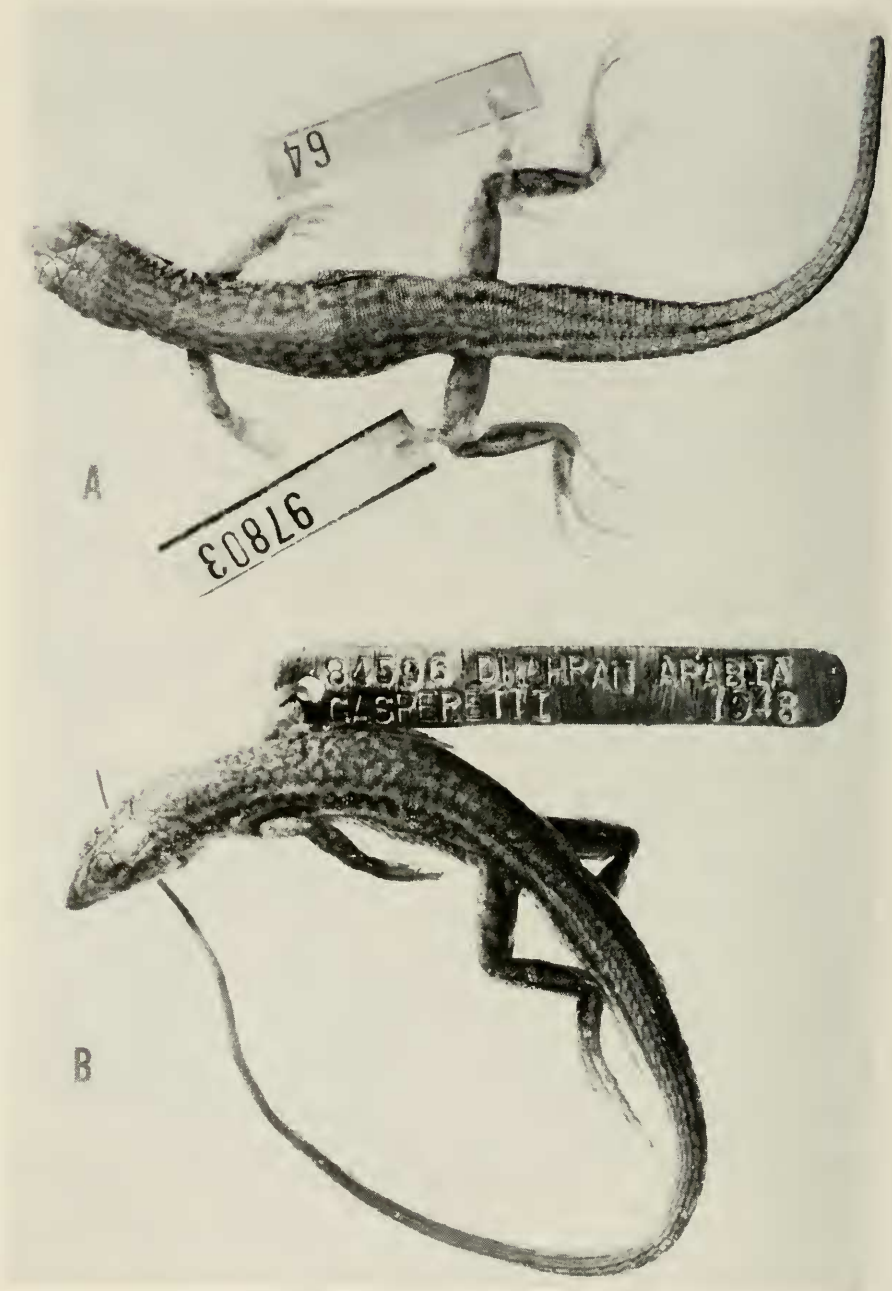


FIGURE 9. A. *Acanthodactylus gongrorhynchatus* [CAS 97803; Holotype]. B. *Acanthodactylus haasi* [CAS 84596; Holotype].

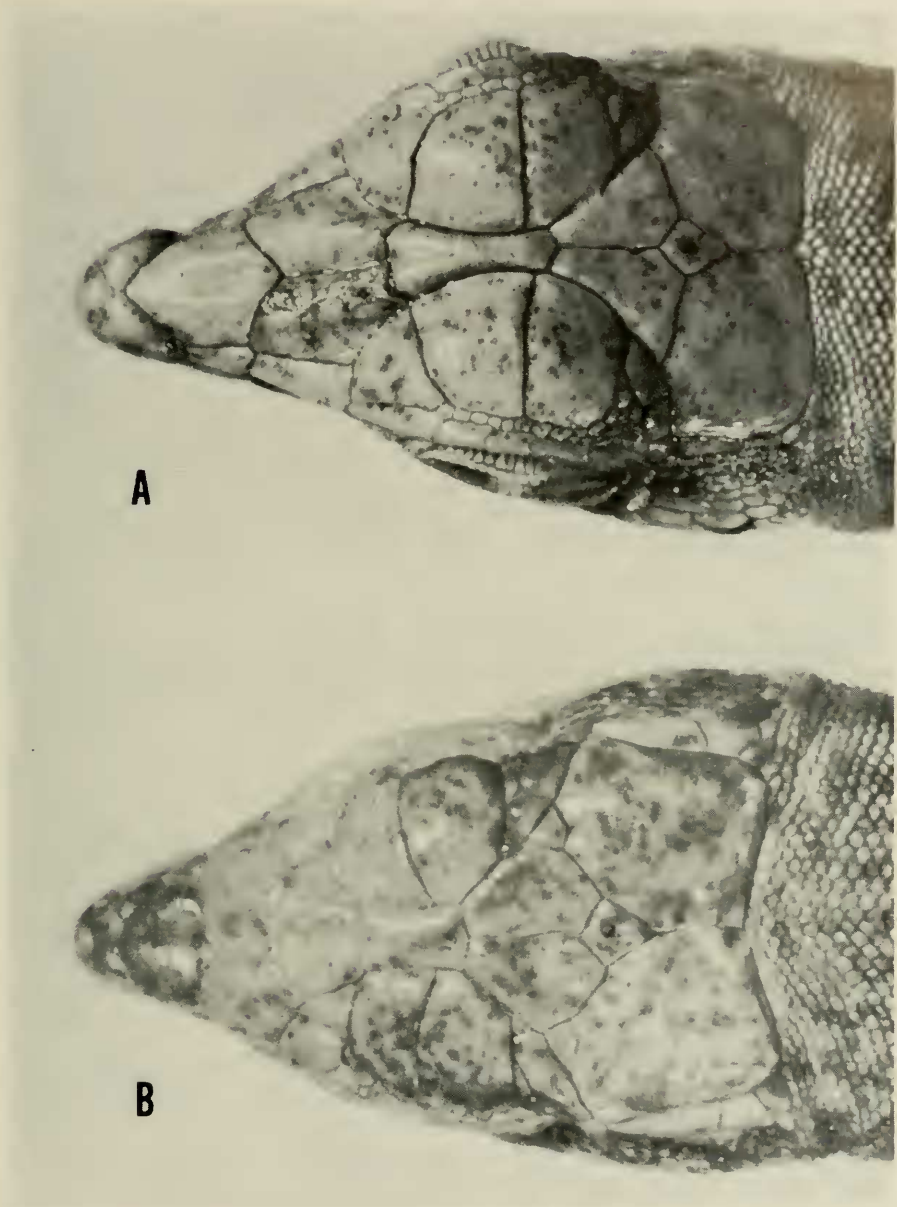


FIGURE 10. A. *Acanthodactylus gongrorhynchatus* [CAS 97803; Holotype]. B. *Acanthodactylus haasi* [CAS 84596; Holotype].

TABLE 1. *Counts and measurements (in millimeters) for Acanthodactylus gongrorhynchatus.*

CAS number	Locality	Sex	Snout- vent length	Tail length	Dorsals at midbody	Ventral scale rows		Gulars	Femoral pores	Supra- labials	Lamellae beneath 4th toe
						Long.	Trans.				
97803	Abu Dhabi	♂	51	—	59	12	29	38	21	4	24
84339	Abqaiq	♂	49	115	66	12	29	39	22/20	4	28
84333	Abqaiq	♀	51	90	73	14	32	38	23/22	4	26
84486	Abqaiq	♀	48	100	67	12	29	44	24/21	4	29
84436	El Alat	♂	42	99	77	12	29	34	25/24	4	29
84433	El Alat	♀	40	98	72	10	30	35	20	4	27
84271	Dhahran	♂	51	106	74	10	30	37	21/20	4	25
FMNH											
73988	Abqaiq	♂	49	—	56	11	28	37	21/20	4	28
Parker											
(1931)	Bahat Jamal	♂	53	—	58	12	31	37	23/24	4	27

rounded or obtusely pointed behind, others rhomboidal, diagonally keeled, sub-caudals keeled, weakly so in basal part of tail; 35 scales in the fourth whorl.

Dorsum light sandy gray in alcohol, with seven indistinct gray longitudinal lines on the body, elements of these coalescing transversely to form a reticulum enclosing light spots; a broad gray stripe down the lateral aspect of the tail; two dorsolateral stripes on body converge on anterior third of tail; hind limbs with an open reticulum of gray lines enclosing larger light areas; head sandy, flecked with light brownish gray. Venter immaculate white.

REMARKS. Among the paratypes we find relatively little variation in scutellation. The frontonasal varies from being as long as broad to about  $1\frac{1}{2}$  times as long as broad; prefrontals are uniformly  $1\frac{1}{2}$  times longer than broad; the length of the frontal equals between  $\frac{3}{5}$  and  $\frac{3}{4}$  its distance from the end of the snout, and is  $1\frac{1}{4}$  to  $1\frac{1}{2}$  times as long as the frontonasal and  $1\frac{3}{4}$  times as long as broad. There are between 28 and 32 scales in a transverse series between the hind limbs.

The systematic position of this new form remains uncertain. In its straight longitudinal series of ventral scales it is like *Acanthodactylus cantoris*, though it differs in dorsal and gular scutellation; its dorsal scutellation is suggestive of *A. scutellatus*, differing here in ventral and gular scutellation. *Acanthodactylus boskianus*, which is presumably close to *A. cantoris* (Hoofien, 1965), is readily distinguished, too, on the basis of dorsal scutellation as well as the number of scales surrounding the fingers. Though the specimens forming the paratypic series of *A. gongrorhynchatus* were originally identified by Haas (1957) as *A. fraseri*, we find they are readily distinguished from that species by characteristics of ventral scutellation.

The diagnosis permits the new taxon to be separated from all previously

described species of *Acanthodactylus* as well as all recognized subspecies of *A. cantoris*, *A. scutellatus*, and *A. boskianus*, and "*A. scutellatus* ssp." of Haas, 1961, at least to the best of our knowledge based on available published data.

Examination of sufficient material of the genus *Acanthodactylus* may be expected to result in a realignment of nominal forms and an improved understanding of the relationships among the members of the genus. This re-examination is, however, beyond the scope of the present investigation.

***Acanthodactylus haasi* Leviton and Anderson, new species.**

(Figures 9B, 10B.)

*Acanthodactylus fraseri* (not Boulenger), Haas, 1957, Proc. Calif. Acad. Sci., ser. 4, vol. 29, p. 72 (part [see also *A. gongrorhynchatus* Leviton and Anderson, cited above]).

HOLOTYPE. CAS 84596, male, collected at Dhahran [Az Zahrān], Saudi Arabia, in 1946 by John Gasperetti.

DIAGNOSIS. Four series of scales around the fingers; lateral and median series keeled, neither enlarged to form fringes, lamellae multicarinate with as many as seven ridges per plate; two large supraoculars, the first and fourth being broken up; ventral plates in 12 straight longitudinal series; dorsal scales subimbricate to imbricate, keeled, 16 in transverse series between hind limbs; outer edge of fourth toe strongly fringed; gular shields 25; longitudinal dorsal scale rows 44; frontonasal broader than long.

DESCRIPTION. Habitus slender, body moderately depressed. Head (tip of snout to angle of jaw)  $1\frac{3}{4}$  as long as broad, its length  $3\frac{3}{4}$  times in snout-vent length, its height equal to distance between center of eye and angle of jaw; a lanceolate concavity from the frontonasal to the middle of the frontal; snout acutely pointed, slightly longer than the postocular part of the head, with sharp canthus; nasals feebly swollen. Neck narrower than head. Hind limb reaches almost to orbit; foot  $1\frac{1}{2}$  times as long as head; fourth toe from base of fifth as long as head. Tail more than twice as long as body.

Upper head shields convex, smooth. Rostral not broader than mental; suture between nasals slightly less than  $\frac{1}{2}$  the length of the frontonasal, which is slightly broader than long and broader than the internarial space; prefrontals longer than broad, forming an extensive median suture; frontal equal to  $\frac{3}{4}$  its distance from end of snout, divided into two shields, the anterior shortest and broadest, the posterior rectangular; frontoparietals longer than broad; parietals longer than broad; two large supraoculars, the position of the first supraocular occupied by two large plates and a smaller elongate plate, the position of the fourth supraocular occupied by an elongate shield (divided on the right side of head), diagonally situated, and a number of smaller scales; five superciliaries, first longest; anterior loreal shorter than second, five supralabials anterior to a



TABLE 2. *Counts and measurements (in millimeters) for Acanthodactylus haasi.*

CAS number	Locality	Sex	Snout- vent length	Tail length	Dorsals at midbody	Ventral scale rows			Femoral pores	Supra- labials	Lamellae beneath 4th toe
						Long.	Trans.	Gulars			
84596	Dhahran	♂	51	115	44	12	29	25	20/19	5	26

position below the center of the eye, the fourth the longest; subocular keeled below eye, not pointed below, and not wedged between two supralabials, resting on the fourth, fifth, and sixth supralabials; two (three on the left) weakly keeled upper temporal shields; temporal scales smooth to weakly keeled, the upper granular, and irregularly shaped, grading into the larger lower temporals; no tympanic shield, two or three scales forming a denticulation in front of the ear opening.

Five pairs of chin shields, the first three in contact in the middle. Twenty-five imbricate gular scales in a line between the symphysis of the chin shields and the median collar plate, enlarged toward the collar. Collar free, curved, with six large plates.

Dorsal scales subimbricate, feebly keeled on nape and body, largest on midline of dorsum, grading into the smaller flank scales; 44 scales across middle of the body, 18 in a transverse series between the hind limbs. Ventral plates in 12 straight longitudinal series and 29 straight transverse series, the outer longitudinal series becoming somewhat oblique, grading into the scales of the flank; a median series of three transversely enlarged preanal plates.

Twenty femoral pores on the right, 19 on the left, the two series narrowly separated in the middle.

Fingers feebly serrated, with four series of scales; toes more strongly serrated, the fringes on the outer side of the fourth toe slightly longer than the diameter of the toe. Twenty-six lamellae under the fourth toe, each with three to seven distinct, sharp keels.

Upper caudal scales much larger than the posterior dorsals, oblique, obtusely pointed, strongly and diagonally keeled; lower caudal scales keeled, including the basals; 28 scales in the fourth whorl.

Color (in alcohol) sandy above, a gray streak running from posterior margin of eye, along flank and side of tail, broken into spots on neck and body; a narrower gray streak on flank where ventral plates meet scales of flank; back and nape covered with a gray, vermiculate reticulation, the elements of which are primarily longitudinally and transversely arranged, this area bordered on either side by an indistinct dark longitudinal streak, these converging on tail. Limbs with fine gray open reticulations enclosing larger sandy areas; head sandy, mottled and flecked with gray. Immaculate sandy tan below.



Family SCINCIDAE  
Genus *Scincus* Laurenti

***Scincus muscatensis* Murray.**

(Figure 11C.)

*Scincus muscatensis* MURRAY, 1886, Ann. Mag. Nat. Hist., ser. 5, vol. 17, pp. 67–68 (type locality: Muscat).

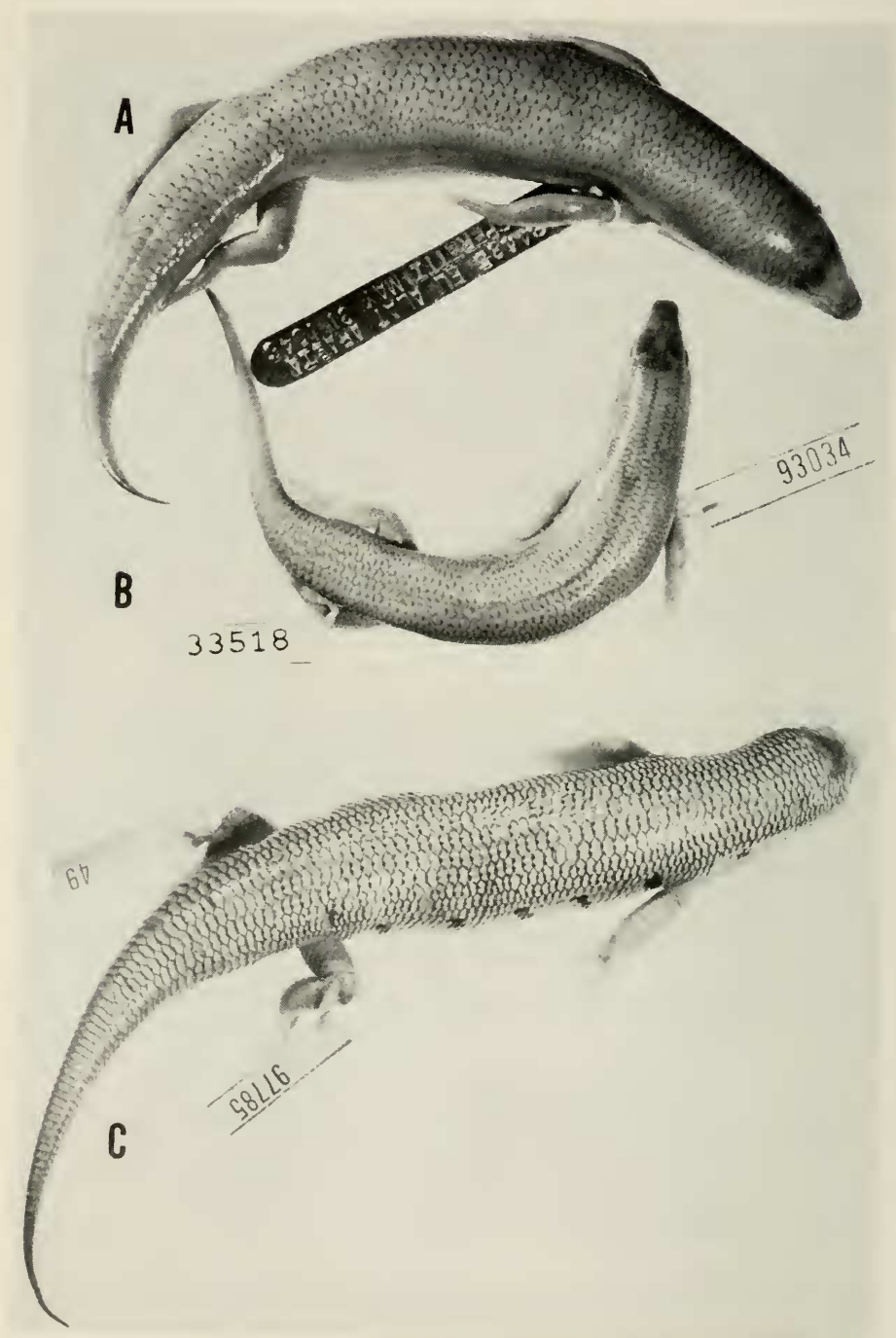
MATERIAL EXAMINED. Thirty specimens. Station 3 (8–11 May 1964): CAS 97780–97785. Station 8 (May–September, 1964): CAS 97768–97775, 97777–97779, 97786–97790, 97792–97796, 98091, and MCZ 85562. Station 2 (4 May 1964): CAS 97776.

REMARKS. The specimens agree closely with Murray's (1886) description and with the illustration given by Boulenger (1887, pl. 32) in all characters save the number of longitudinal scale rows at mid-body. In our series there are between 27 and 30 scale rows (mean = 29.4). Murray and Boulenger state that there are 26 scale rows around the body. We suggest after careful examination of Boulenger's figure that these workers may have erred in their counts, for a comparison of the figure with our specimens suggests that Murray's specimens must have had 28 scale rows at mid-body.

Re-examination of a large series of specimens from the Al Hasa district, Saudi Arabia, referred to *Scincus philbyi* Schmidt by Haas (1957) leads us to question the status of the several nominal species of *Scincus* from central and gulf coast Arabia. We find, for example, that Haas erred in his counts of mid-body scale rows in the series of specimens he had before him and which we have re-examined. According to Haas (1961, p. 25) there are 26–28 scale rows at mid-body, while we find 26–30 (mean 28.4). In this same paper Haas described *S. richmondi* from Al Hasa which he distinguished from *S. philbyi*, "but possessing paired prefrontals and 30 scale rows around the middle of the body instead of 26 in *philbyi* . . ." In his paper published in 1957 (p. 78) Haas noted that of 45 specimens of *S. philbyi* he had before him, 14 specimens "have 2 prefrontals, which is normal for other species in the genus, and 31 individuals have the prefrontal fused into a single scale . . ." We have examined the paratype of *S. richmondi*, CAS 93034, and find it to be conspecific with specimens identified by Haas as *S. philbyi*. (figs. 11 A–B).

We have not seen specimens of the type series of *S. philbyi* from Anaiza, central Arabia, but based on Schmidt's description (1941, p. 162) we feel reasonably certain that that series of specimens and ours from the Al Hasa district will prove to be close.

The specimens listed by Haas (1957, p. 78) from Sharja (HUF 2671–2672) as *S. philbyi* doubtless belong to *S. muscatensis*. *Scincus philbyi* and *S. muscatensis* are closely allied, and likely should be referred to a single species, though



recognized as distinct subspecies. We defer in taking this action, however, until the type series of *S. philbyi* can be examined and compared with our material from Al Hasa to be certain that the standard of comparison we have used in this study, the Al Hasa material identified as *S. philbyi*, is properly allocated.

#### Family AMPHISBAENIDAE

#### Genus *Diplometopon* Nikolsky

#### *Diplometopon zarudnyi* Nikolsky.

*Diplometopon zarudnyi* NIKOLSKY, 1905, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, vol. 10, p. 277, figs. 1-3 (type locality: Nasrie, Arabistan, Iran).

MATERIAL EXAMINED. Three specimens. Station 9 (1 August 1964): CAS 97085. Station 3 (11-15 May 1964): CAS 97806-97807.

REMARKS. Haas (1957, p. 71) reported a specimen from Shārja [Ash Shāriqah], Trucial Coast.

#### Family BOIDAE

#### Genus *Eryx* Daudin

#### *Eryx jayakari* Boulenger.

*Eryx jayakari* BOULENGER, 1888, Ann. Mag. Nat. Hist., ser. 6, vol. 2, p. 508 (type locality: Muscat).

MATERIAL EXAMINED. Four specimens. Station 8 (28 May 1964): CAS 97797-97798; (17 July 1964): CAS 97800. Station 2 (16 July 1964): CAS 97799.

REMARKS. Haas reported a single specimen from Shārja, [Ash Shāriqah], Trucial Coast (1957, p. 79).

Counts and measurements for specimens of *Eryx jayakari*, including unverified literature records, are summarized in table 3.

#### Family COLUBRIDAE

#### Genus *Lytorhynchus* Peters

#### *Lytorhynchus gaddi* Nikolsky.

*Lytorhynchus gaddi* NIKOLSKY 1907, Ann. Mus. Zool. Imp. Sci. St. Petersburg, vol. 10, p. 294 (type locality: Dizful [= Dezful], Iran).

←

FIGURE 11. A. *Scincus philbyi* [CAS 84435] from El Alat. B. *Scincus richmondi* [CAS 93034; Paratype] (= *Scincus philbyi*) from Al Hasa (see text). C. *Scincus muscatensis* [CAS 97781].

TABLE 3. Summary of counts for *Eryx jayakari*.  
(Literature records unverified as to sex or counts.)

Locality		Ventrals	Subcaudals	Scale rows
Abu Dhabi	3 ♂ ♂	171-176	21-24	47-49
	1 ♀	169	21	47
Abqaiq	2 ♂ ♂	175-178	18-21	43-45
	4 ♀ ♀	173-181	18-21	45-47
Dhahran	4 ♂ ♂	167-177	20-21	43-51
	1 ♀	170	19	45
El Alat	1 ♂	169	23	43
	1 ♀	178	20	
Muscat—Holotype	1 ♀	180	20	41
Southern Hejaz	1 juv	167	21	45
Jahasi, S.E. Arabia	1 ♀	184	22	47

*Lytorhynchus diadema arabicus* HAAS, 1952, Copeia, 1952, p. 22 (*nomen dubium*); 1957, Proc. Calif. Acad. Sci., ser. 4, vol. 29, p. 80 (type locality: Abqaiq [Buqayq], Saudi Arabia).

MATERIAL EXAMINED. Three specimens. Station 1 (1963): CAS 98092. Station 8 (4 August, 8 September 1964): CAS 97809-97810.

REMARKS. These specimens are included in a review of the genus *Lytorhynchus* (Leviton and Anderson, in preparation).

#### Genus *Malpolon* Fitzinger

##### *Malpolon moilensis* (Reuss).

*Coluber moilensis* REUSS, 1834, Mus. Senck., vol. 1, p. 142, pl. 7, fig. 1 (type locality: Moilah, Arabia).

*Malpolon moilensis*, PARKER, 1931, Ann. Mag. Nat. Hist., ser. 10, vol. 8, p. 522.

MATERIAL EXAMINED. Three specimens. Station 1 (1963 collected by C. Khemanand): CAS 97830-97832.

REMARKS. The following counts are taken from specimens at hand:

		Ventrals	Subcaudals
CAS 97830	♂	171	(43+)
97831	♂	174	62
97832	♀	180	64

Specimens from the Arabian Peninsula have higher counts than those from Egypt and westward. In specimens from the Persian Gulf coast (specimens from Dhahran and Abqaiq included) males have 164-174 ventrals, females 174-180. These counts are similar to specimens reported from southern Arabia (J. Anderson, 1896, 1898; Haas and Battersby, 1959), although Anderson (1901) lists a female from "Abian country" with 167 ventrals. A male from Abu Roash,

near Cairo has 159 ventrals (Anderson, 1898), females from Egypt and Sudan having 157–174. Males from Libya have 152–162, females 159–172 (Kramer and Schnurrenberger, 1963). A single specimen from Tunisia, reportedly a female (Boulenger, 1896; J. Anderson, 1898) has 159 ventrals. There is marked sexual dimorphism in number of ventrals within populations. As noted by Kramer and Schnurrenberger (1963), one cannot rely on the sexual determinations given by Boulenger (1896) for his specimens of this species, or in fact for any species (see also remarks by Leviton, 1964: 452).

### Genus *Psammophis* Boie

#### *Psammophis schokari* (Forskål).

*Coluber schokari* FORSKÅL, 1775, Descr. Anim., p. 14 (type locality: Yemen).

*Psammophis schokari*, BOULENGER, 1896, Cat. Snakes British Mus., vol. 3, p. 157.

MATERIAL EXAMINED. One specimen. Station 1 (1963 collected by C. Khemanand): CAS 97808.

REMARKS. This juvenile male has 178 ventrals and 117 + subcaudals. CAS 84418, a male from Qatif (Haas, 1957), has 181 ventrals and 132 subcaudals. Table 4 summarizes the counts available for this species. On the basis of subcaudal and total counts, at least three populations appear to be recognizable: the lowest counts are those from the Sudan, the highest from the Arabian Peninsula, Iran, Afghanistan, and West Pakistan, with North African animals intermediate. Without rechecking sex determination and counts for all specimens in the literature, statistical analysis of the data is not practicable. Low subcaudal counts reported for some specimens, particularly from Egypt and Arabia suggest incomplete tails. There appears to be no marked sexual dimorphism in counts.

### Family VIPERIDAE

#### Genus *Cerastes* Wagler

#### *Cerastes cerastes gasperettii* Leviton and Anderson, new subspecies.

(Figure 12.)

*Vipera cerastes* (not *Coluber cerastes* Linnaeus, 1758), STRAUCH, 1869, Mém. Acad. Imp. Sci. St. Petersbourg, ser. 7, vol. 14, p. 113.

*Cerastes cornutus* (not *Cerastes cornutus* Forskål, 1775), J. ANDERSON, 1896, Herp. Arabia, pp. 71, 83, 87, 89; 1898, Zool. Egypt, vol. 1, p. 334; 1901, Proc. Zool. Soc., 1901, p. 151. PARKER, 1931, Ann. Mag. Nat. Hist., ser. 10, vol. 8, p. 522; 1932, in Thomas, "Arabia Felix," p. 344.

*Aspis cerastes*, PARKER, 1938, Ann. Mag. Nat. Hist., ser. 11, vol. 1, p. 490. SCHMIDT, 1939, Field Mus. Nat. Hist. Zool. Ser., vol. 24, p. 88; 1941, Field Mus. Nat. Hist. Zool. Ser., vol. 24, p. 165. HAAS AND BATTERSBY, 1959, Copeia, p. 202. HAAS, 1961, Ann. Carnegie Mus., vol. 36, p. 21.

*Cerastes cerastes*, HAAS, 1957, Proc. Calif. Acad. Sci., ser. 4, vol. 29, pp. 82–83. CORKILL AND COCHRANE, 1965, Jour. Bombay Nat. Hist. Soc., vol. 62 (1965), p. 499.

TABLE 4. *Summary of counts for specimens of Psammophis schokari.*  
(Literature records unverified for sex or counts.)

	Ventrals	Subcaudals	Ventrals and subcaudals
Sudan (Boulenger, 1896; J. Anderson, 1898) <sup>1</sup>			
9 ♂ ♂	166-173	96-106	266-278
6 ♀ ♀	164-174	93-105	260-279
Northeastern Algeria (Boulenger, 1896; J. Anderson, 1898)			
♀	183	119	302
Southern Tunisia (Boulenger, 1896; J. Anderson, 1898)			
♂	179	131	310
Libya (Kramer and Schnurrenberger, 1963) <sup>2</sup>			
22 ♂ ♂	178.4 ± 0.8	119 ± 1.3	297.4 <sup>3</sup>
18 ♀ ♀	180.6 ± 0.9	120.2 ± 0.9	300.8 <sup>3</sup>
Egypt (Boulenger, 1896; J. Anderson, 1898; Marx, 1958)			
41 ♂ ♂	163-195	104 <sup>4</sup> -123	283-306
9 ♀ ♀	170-177	112-117	288-290
Sinai Peninsula (Boulenger, 1896; J. Anderson, 1898; Schmidt and Marx, 1956)			
3 ♂ ♂	168-177	109-119	278-296
♀	179	103	282
Israel			
♂	164	111	275
Arabian Peninsula (Boulenger, 1896; J. Anderson, 1898, 1901; Scortecci, 1932; Schmidt, 1953; Haas & Battersby, 1959)			
4 ♂ ♂	170-181	132-141	311-313
8 ♀ ♀	168-190	110 <sup>5</sup> -151	296 <sup>5</sup> -317
Iran (Boulenger, 1896; J. Anderson, 1898; Wall, 1908; Werner, 1936; Mertens, 1957; S. Anderson, 1963)			
2 ♂ ♂	185-194	110 <sup>4</sup> -126	295-320
5 ♀ ♀	178-183	117-127	295-309
Afghanistan (Boulenger, 1896; J. Anderson, 1898; Leviton, 1959)			
♂	194	-	
♀	184	-	
3 undetermined	183-185	122-126	310-311
West Pakistan			
4 ♂ ♂	172-177	122-126	294-303
♀	182	135	317

<sup>1</sup> Excludes one specimen of undetermined sex from Khartoum reported to have 190 ventrals, 121 subcaudals (Boulenger, 1896).

<sup>2</sup> Mean values only.

<sup>3</sup> Summation of mean ventral count + mean subcaudal count.

<sup>4</sup> Incomplete tail?

<sup>5</sup> If two low subcaudal counts of 110 and 117, perhaps incomplete tails, are excluded, the subcaudal counts for ♀ ♀ become 129-154, total count 314-317.

HOLOTYPE. CAS 97826, male, collected at Beda Azan [23°41' N., 53°28' E.], Abu Dhabi [Abū Zaby], 23 August 1964 by John Gasperetti.

PARATYPES. Twenty-four. Abu Dhabi: CAS 97827, Station 8 (8 September 1964); CAS 97828, Station 3 (10 May 1964); CAS 97829, Station 8 (13 July



1964); CAS 98093–98094, Station 1 (1963, collected by C. Khemanand). Saudi Arabia: CAS 102364, Qaşr Ibn Uqayyil ( $43^{\circ}21'$  E.,  $25^{\circ}50'$  N.); CAS 84503, 84506, 84520–84521, 84527, 84531, 84555, 84560–84561, 84563–84564, 84566, Dhahran (1946); CAS 84481, 84490, 84495–84496, Abqaiq (1946); CAS 84424–84425, Shimal (1946); CAS 84440, Abū Shaiba (1946). [All specimens collected by J. Gasperetti except as noted.]

DIAGNOSIS. Ventrals, male 151–162, female 153–172; nasal shield large, separated from rostral and first supralabial by one row of scales; an enlarged supranasal, bordered anteriorly by an enlarged scale; without a cluster of enlarged scales on the mid-occipital region.

REMARKS. Counts and measurements for these specimens are given in table 5. Summary counts for *Cerastes cerastes* are recognizable on the basis of available specimens and literature. *Cerastes cerastes cerastes* (type locality "Egypt," restricted by Flower, 1933) has 139–149 ventrals in males, 143–151 ventrals in females, and is found in Sudan and Egypt (at least east of the Nile) and the Sinai Peninsula. Animals from Israel and Jordan also may belong to this



FIGURE 12. *Cerastes cerastes gasperettii* [CAS 97826; Holotype].

TABLE 5. *Counts and measurements (in millimeters) for the holotype and paratypes of Cerastes cerastes gasperettii Leviton and Anderson.*

CAS number	Locality	Sex	Snout-vent length	Tail length	Ventrals	Subcaudals	Scale rows	Upper labials	Lower labials
Holotype									
97826	Abu Dhabi: Beda Azan	♂	508	72	159	41	35	14/15	15
Paratypes									
97827	Abu Dhabi: Station 8	♂	560	82	159	37	33	15/14	14/15
97828	Abu Dhabi: Station 3	♀	276	32	172	38	34	17/16	17/16
97829	Abu Dhabi: Station 8	♀	574	66	167	39	34	15	16
98093	Abu Dhabi: Station 1	♀	567	—	169	30+	35	15	15
98094	"		incomplete specimen				37	15	16/17
84440	Saudi Arabia: Abu Shaiba	♂	439	53	159	35	35	16	16
84424	Saudi Arabia: Shimal	♀	312	32	159	34	32	15/14	15
84425	"	♀	324	35	161	34	32	15	14
84481	Saudi Arabia: Abqaiq	♂	640	82	153	35	34	14	15
84490	"	♂	604	70	154	36	34	14	15/14
84495	"	♀	760	—	168	—	32	15/16	15
84496	"	♀	400	42	163	35	32	14	14
84503	Saudi Arabia: Dhahran	♂	415	52	158	37	33	15/14	14
84521	"	♂	210	37	154	38	33	14	14
84527	"	♂	435	60	151	36	33	16	15
84561	"	♂	400	54	155	31	33	14	15/14
84563	"	♂	290	37	156	36	31	14/13	15
84566	"	♂	273	34	154	35	32	14/15	14
84506	"	♀	309	36	156	36	31	14	15/14
84520	"	♀	360	43	162	36	36	16	15
84531	"	♀	265	25	161	32	34	15	13/14
84555	"	♀	465	50	163	33	37	17	16
84560	"	♀	568	60	156	33	35	17	16/15
84564	"	head and neck only			—	—	—	15	15
102364	Saudi Arabia: 25°50' N. 43°21' E.	♀	653	66	162	31	37	14/15	15

taxon. *Cerastes cerastes gasperettii* is the form of the Arabian Peninsula, occurring from the northwestern part of the peninsula east of the Gulf of Aqaba, east and south to the Persian Gulf, Arabian Sea, and the Gulf of Aden.

A North African population, of which specimens are recorded from Algeria and Libya, has a lower ventral count (males: 133–141, females: 135–141) than is found in the more eastern population. We do not name this taxon, owing to lack of adequate material for comparison.

Sexual dimorphism in subcaudal count is evident in the material from Sudan and from Libya (table 6), but is not indicated in specimens from other areas.

The following specimens have well developed supraciliary "horns": CAS 84495, 84527, 84560, 84564, 102364. A stage somewhat intermediate between "horned" and "hornless" is represented by 97827 in which an elongate protuber-

TABLE 6. *Summation of counts for specimens of Cerastes cerastes.*<sup>6</sup>

	Ventrals	Subcaudals	Ventrals and subcaudals
Sudan (Boulenger, 1896; J. Anderson, 1888)			
4 ♂ ♂	140-142	33-35	173-177
4 ♀ ♀	143-147	29-33	173-178
Northeastern Algeria (Boulenger, 1896)			
♂	133	29	162
Libya (Kramer and Schnurrenberger, 1963)			
13 ♂ ♂	133-141	30-36	168.5 <sup>7</sup>
6 ♀ ♀	135-141	26-28	165.5 <sup>7</sup>
Egypt (Boulenger, 1896; J. Anderson, 1898; Schmidt and Marx, 1957)			
13 ♂ ♂	140-149	33-38	180-189
17 ♀ ♀	143-151	29-40	178-189
Sinai Peninsula (Boulenger, 1896; J. Anderson, 1898; Schmidt and Marx, 1956)			
2 ♂ ♂	139-144	33	172
♀	145	33	178
Arabian Peninsula <sup>8</sup> (Boulenger, 1896; J. Anderson, 1901; Parker, 1931, 1938; Schmidt, 1941; Haas & Battersby, 1959; Haas, 1961)			
12 ♂ ♂	151-162	31-41	186-200
20 ♀ ♀	153-172	31-36	186-210

<sup>6</sup> Specimens of undetermined sex not included.<sup>7</sup> Summation of mean ventral + mean subcaudal counts.<sup>8</sup> Not included are a ♂ specimen listed as "Arabia" (Boulenger, 1896) having 140 ventrals and 34 subcaudals, and a ♀ from "Abian country," southern Arabia (Anderson, 1901) having 139 ventrals and 37 subcaudals.TABLE 7. *Summation of counts for specimens of Cerastes cerastes from the Arabian Peninsula.*

	Ventrals	Subcaudals	Ventrals and subcaudals
Abu Dhabi			
2 ♂ ♂	159	37-41	196-200
2 ♀ ♀	169-172	38-39	206-210
Dhahran—Oil field region: Abqaiq—Shimal—Abu Shaiba—Jafura desert			
9 ♂ ♂	151-159	31-38	186-195
10 ♀ ♀	156-168	32-39	189-205
Central Arabia			
2 ♀ ♀	153-162	31-33	186-193
Midian, northwestern Arabia			
♀	155	34	189
Western Arabia (Southern Hejaz)			
♀	156	32	188
Hadramaut			
♀	164	34	198
Ramlaut Shuait, southeastern Arabia			
♂	162	36	198

ant keel is developed on a scale over each eye. This does not approach the length of the horns of the other specimens.

Family HYDROPHIIDAE

Genus *Hydrophis* Latreille

*Hydrophis cyanocinctus* Daudin.

*Hydrophis cyanocinctus* DAUDIN, 1803, Hist. Nat. Rept., vol. 7, p. 383 (type locality: Coromandel).

MATERIAL EXAMINED. Two specimens. CAS 97812, 97813, at or near station 1, collected by C. Khemanand in 1963.

Genus *Pelamydrus* Stejneger

*Pelamydrus platurus* (Linnaeus).

*Anguis platurus* LINNAEUS, 1766, Syst. Nat., ed. 12, p. 391 (type locality: unknown).

MATERIAL EXAMINED. One specimen. CAS 97811, at station 1, collected by C. Khemanand in 1963.

REMARKS. The brown color of the dorsum covers only 10 scale rows, five on each side of the median line. The brown color is not as dark as one finds on animals from the Pacific basin.

CONCLUSIONS

Twenty-two species of amphibians and terrestrial reptiles are now known from the Sheikhdome of Abu Dhabi (see table 8); 16 of these are represented in the present collection. Of the 22 species known from this region only three, *Bunopus abudhabi*, *Stenodactylus leptocosymbotes*, and *Stenodactylus arabicus*, nominal taxa based on but one or two specimens each, are known only from Abu Dhabi. However, even these three are most closely allied to other Arabian species so they present little difficulty in interpreting the general relations of the herpetofauna of the sheikhdome.

The herpetofauna of the Abu Dhabi region is part of the Arabian coastal fauna which extends from Aden east to Oman and northwest along the Persian Gulf coast through lowland western Iran. The species, and more particularly the subspecies composition of this fauna changes along this coastal margin, but changes are transitional rather than abrupt and certain species, for example *Uromastix microlepis*, are ubiquitous. Central Arabia, including the Rub' al Khali, is still unknown, and the extent to which the coastal fauna ranges inland remains a pressing problem. Those species which are known from central Arabia appear to be widely ranging forms known also from Abu Dhabi and environs. Some, indeed, extend even across the Iranian Plateau and into Turkmen SSR (e.g. *Phrynocephalus maculatus*, *Varanus griseus*, *Psammophis schokari*).

Of zoogeographic interest is the fact that while there is geologic evidence of

TABLE 8. *Terrestrial amphibians and reptiles known from the Trucial States, Arabian Peninsula.*

AMPHIBIANS		
Family BUFONIDAE		
<i>Bufo dhufarensis</i> Parker		<i>Bufo pentoni</i> Anderson
REPTILES		
Lizards		
Family GEKKONIDAE		
<i>Bunopus abudhabi</i> Leviton & Anderson		<i>Stenodactylus arabicus</i> Haas
<i>Stenodactylus leptocosymbotes</i> Leviton and Anderson		<i>Cyrtodactylus scaber</i> (Heyden)
<i>Stenodactylus major</i> Parker		
Family AGAMIDAE		
<i>Agama jayakari</i> Anderson		<i>Uromastyx microlepis</i> Blanford
<i>Phrynocephalus arabicus</i> Parker		
Family SCINCIDAE		
<i>Scincus muscatensis</i> Murray		( <i>Scincus philbyi</i> Schmidt)
Family LACERTIDAE		
<i>Acanthodactylus cantoris schmidtii</i> Haas		<i>Eremias adramitana</i> Boulenger
<i>Acanthodactylus gongrorhynchatus</i> Leviton & Anderson		
Family VARANIDAE		
<i>Varanus griseus</i> (Daudin)		
Amphisbaenids		
Family AMPHISBAENIDAE		
<i>Diplometopon zarudnyi</i> Nikolsky		
Snakes		
Family BOIDAE		
<i>Eryx jayakari</i> Boulenger		
Family COLUBRIDAE		
<i>Lytorhynchus gaddi</i> Nikolsky		<i>Psammophis schokari</i> (Forskål)
<i>Malpolon moilensis</i> (Reuss)		
Family ELAPIDAE		
( <i>Naja haje arabica</i> Scortecchi)		( <i>Walterinnesia aegyptia</i> Lataste)
Family VIPERIDAE		
<i>Cerastes cerastes gasperettii</i> Leviton and Anderson		
Turtles		
Family EMYDIDAE		
<i>Clemmys caspica caspica</i> (Gmelin)		

Pleistocene terrestrial contact across the eastern Persian Gulf, in the vicinity of the Straits of Hormoz, there is no evidence of extensive faunal exchange between the Arabian Peninsula and lowland eastern Iran-West Pakistan. The genus *Phrynocephalus* may have entered Arabia via this passage for the genus is not known to have crossed the Zagros Mountains of western Iran. Further, with the exception of the two closely related Arabian species, the genus does not extend to the south and west of the Iranian Plateau. *Acanthodactylus cantoris*, also known from West Pakistan as well as Arabia, is a lowland species, too; however, the coastal Arabian subspecies is also found along the coast of western



Iran bordering the Persian Gulf. All other species of reptiles shared by Arabia and the lowlands of the northeastern gulf coast are widely distributed Southwest Asian species having considerable altitudinal and ecological ranges. Of course, our knowledge of the Arabian fauna is very incomplete, particularly along the Trucial Coast, and we might suggest that the Oman Mountains would be the most likely refuge for herpetological novelties derived from previous faunal contact across the Persian Gulf; these mountains should be investigated for such evidence.

Apart from the exceptions mentioned already, the reptiles of the Abu Dhabi region belong to a complex of Arabian desert species and species groups which have affinities largely with the North African desert fauna. This herpetofauna, in our opinion, should be regarded as a subsection of the Saharo-Sindian fauna, the subdivision status being justified by the large number of endemics in Arabia, even though their general relationships are obvious. There are too few Iranian (or Irano-Turanian Auct!) elements in the fauna to consider seriously that the Arabian fauna be assigned to that faunal subdivision, which is the other major component of the Southwest Asian fauna (S. Anderson, 1967).

It must be remembered that our knowledge of the herpetofauna of the Abu Dhabi region is fragmentary and pertains to the low sandy areas a few miles inland from the coast. Little is known of the fauna of the oases or of the Oman Mountains; both areas should be of unusual zoogeographic interest. Further, faunistic studies are urgently needed in Arabia and elsewhere in Southwest Asia as the prominent vertebrate species are becoming progressively restricted and threatened with extinction due to man's depredation. The less conspicuous elements of the fauna will be of increasing importance in deciphering zoogeographic puzzles even in the most remote areas.

#### LITERATURE CITED

ANDERSON, JOHN

- 1896. A contribution to the herpetology of Arabia with a preliminary list of the reptiles and batrachians of Egypt. London, 122 pp.
- 1898. Reptilia and Batrachia. In: Zoology of Egypt, Volume I. London, 1xv + 371 pp., 50 pls.
- 1901. A list of the reptiles and batrachians obtained by Mr. A. Blayney Percival in southern Arabia. Proceedings of the Zoological Society of London, 1901, pp. 137-152, pls. 14, 15.

ANDERSON, STEVEN C.

- 1963. Amphibians and reptiles from Iran. Proceedings of the California Academy of Sciences, ser. 4, vol. 31, pp. 417-498.
- 1966. A substitute name for *Agama persica* Blanford. Herpetologica, vol. 22, p. 230.
- 1967. Zoogeographic analysis of the lizard fauna of Iran. In Fisher, W. B. (ed.), Cambridge history of Iran, vol. 1 (in press).

BOULENGER, GEORGE A.

- 1887. A list of the reptiles and batrachians obtained near Muscat, Arabia, and presented

- to the British Museum by Surgeon-Major A. S. G. Jayakar. *Annals and Magazine of Natural History*, ser. 5, vol. 20, pp. 407, 408.
1888. Description of a new snake from Muscat, Arabia. *Annals and Magazine of Natural History*, ser. 6, vol. 2, pp. 508-509.
1896. Catalogue of the snakes in the British Museum (Natural History). Volume 3. London, xiv + 727 pp., 25 pls.
- CORKILL, N. L., and J. A. COCHRANE
1966. The snakes of the Arabian Peninsula and Socotra. *Journal of the Bombay Natural History Society*, vol. 62 (1965), pp. 475-506, map.
- FLOWER, STANLEY S.
1933. Notes on the recent reptiles and amphibians of Egypt with a list of the species recorded from that kingdom. *Proceedings of the Zoological Society of London*, 1933, pp. 735-851.
- GASPERETTI, JOHN
- Survey of the reptiles of the Sheikhdum of Abu Dhabi, Arabian Peninsula. Part I. A geographical sketch of the Sheikhdum of Abu Dhabi. *Proceedings of the California Academy of Sciences*, ser. 4, vol. 35, no. 8, pp. 141-156.
- HAAS, GEORG
1957. Some amphibians and reptiles from Arabia. *Proceedings of the California Academy of Sciences*, ser. 4, vol. 29, pp. 47-86.
1961. On a collection of Arabian reptiles. *Annals of the Carnegie Museum*, vol. 36, pp. 19-28.
- HAAS, G., and J. C. BATTERSBY
1959. Amphibians and reptiles from Arabia. *Copeia*, 1959, pp. 196-202.
- HOOFIEN, J. H.
1965. On some herpetological records from Sinai and Transjordan. *Israel Journal of Zoology*, vol. 14, pp. 122-127.
- KRAMER, EUGEN, and H. SCHNURRENBERGER
1963. Systematik, Verbreitung und Ökologie der Libyschen Schlangen. *Revue Suisse de Zoologie*, vol. 70, pp. 453-568, 5 pls.
- LEVITON, ALAN E.
1959. Report on a collection of reptiles from Afghanistan. *Proceedings of the California Academy of Sciences*, ser. 4, vol. 29, pp. 445-463.
1964. Contributions to a review of Philippine snakes, III. The genera *Maticora* and *Calliophis*. *The Philippine Journal of Science*, vol. 92, pp. 523-550.
- LEVITON, A. E., and STEVEN C. ANDERSON
1963. Third contribution to the herpetology of Afghanistan. *Proceedings of the California Academy of Sciences*, ser. 4, vol. 31, pp. 329-339.
- MARN, HYMEN
1958. Egyptian snakes of the genus *Psammophis*. *Fieldiana: Zoology*, vol. 39, pp. 191-200.
- MERTENS, ROBERT
1956. Amphibien und Reptilien aus S. O.-Iran, 1954. *Jahreshefte des Vereins für vaterländische Naturkunde in Württemberg*, vol. 3, pp. 90-97.
1957. Weitere Unterlagen zur Herpetofauna von Iran 1956. *Jahreshefte des Vereins für vaterländische Naturkunde in Württemberg*, 112 Jahrg., pp. 118-128.
1965. Bemerkungen über einige Eideschsen aus Afghanistan. *Senckenbergiana Biologica*, vol. 46, pp. 1-4.

MURRAY, JAMES A.

1886. Description of an apparently new species of *Scincus* from Muscat. *Annals and Magazine of Natural History*, ser. 5, vol. 17, pp. 67, 68.

PARKER, HAMPTON W.

1931. Some reptiles and amphibians from S. E. Arabia. *Annals and Magazine of Natural History*, ser. 10, vol. 8, pp. 514-522.  
1938. Reptiles and amphibians from the southern Hejaz. *Annals and Magazine of Natural History*, ser. 11, vol. 1, pp. 481-492.

SCHMIDT, KARL P.

1941. Reptiles and amphibians from central Arabia. *Field Museum of Natural History, Zoological Series*, vol. 24, pp. 161-165.  
1953. Amphibians and reptiles of Yemen. *Fieldiana: Zoology*, vol. 34, pp. 253-261.

SCHMIDT, K. P., and ROBERT F. INGER

1957. *Living reptiles of the world*. Garden City, New York, 287 pp.

SCHMIDT, K. P., and HYMEN MARX

1956. The herpetology of Sinai. *Fieldiana: Zoology*, vol. 39, pp. 21-40.

SCORTECCI, GIUSEPPE

1932. Rettili dello Yemen. *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano*, vol. 71, pp. 39-49.

WALL, FRANK

1908. Notes on a collection of snakes from Persia. *Journal of the Bombay Natural History Society*, vol. 18, pp. 795-805.

WERNER, FRANZ

1936. Reptilien und Gliedertier aus Persien. *Festschrift zum 60 Geburtstage von Professor Dr. Embrik Strand*, vol. 2, pp. 193-202.